

# **Wet Weather Monitoring Plan**

# Prepared by: Utah Department of Transportation

November 2016



## **Table of Contents**

1 ١	Wet Weather Monitoring	1-1
1.1		
	1.1.1 Permit Requirements	1-1
	1.1.2 Decisions and Outcomes	1-1
1.2	Project Schedule	1-2
2 \$	Sampling Approach2	2_1
2.1	, • ,,	
2.1		
2.2	5 · · · · · · · · · · · · · · · · · · ·	
2.4		
2.5		
2.6		
	6 Chain-of-Custody and Sample Transfer Procedure	
	2.6.2 Chain-of-Custody Forms	
	2.6.3 Transfer of Custody	
	7 Sampling Team	
	2.7.1 Training	
	2.7.2 Health and Safety	
	3 Sampling Techniques	
	2.8.1 Grab Samples	
	2.8.2 Flow Weighted Composite Samples	
	9 Analytical Requirements	
2.1		
	. •	
3 (	Quality Assurance / Quality Control Plan	
3.1	1 0 1 1	
3.2		
3.3		
	3.3.1 Field Blank	3-1
;	3.3.2 Sample Duplicate	3-1
	3.3.3 Sample Split	3-2
3.4	4 Laboratory Requirements	3-2
4 \$	Sampling Waiver	4-1
4.1		
	Camping Waver	
Tak	oles	
Table	o 1. Kov Draiget Milestones	4 2
Table	e 1: Key Project Milestones	1-Z
	e 2: Monitoring Site Locations	
	e 3: Parameters for Flow Weighted Composite Analyses	
	e 4: Parameters for Grab Sample Analyses	
Table	e 5: Laboratory Holding Times and Preservatives	ა-2 ე ე
ı able	e 6: Laboratory Required Volumes	<b>ა-</b> პ



# **Figures**

Figure 1: UDOT Wet Weather Monitoring Locations	2-2
Figure 2: JOR 03 Monitoring Site Location	
Figure 3: MVC 01 and MVC 02 Sampling Location	
Figure 4: UDOT Maintenance Station 3427 - Monitoring Location	

# **Appendices**

Appendix A: Wet Weather Monitoring Locations

Appendix B: Wet Weather Monitoring Field Procedures

Appendix C: Sample Chain of Custody Form



## 1 Wet Weather Monitoring

#### 1.1 Introduction

The objective of wet weather monitoring is to estimate annual cumulative pollutant loadings and event mean concentrations, and to assess stormwater quality trends. The data obtained during this program will assist in the assessment of potential stormwater impacts. It may be used to identify areas requiring additional controls and to identify water quality improvements or degradation. This monitoring plan meets the requirements of the Utah Pollutant Discharge Elimination System (UPDES) Permit No. UTS000003 issued to the Utah Department of Transportation (UDOT) authorizing the discharge stormwater to waters of the State. The Permit was issued on December 3, 2015.

#### 1.1.1 Permit Requirements

UPDES Permit No. UTS000003, Part 5.2.1 states in part,

"Wet Weather Monitoring Plan: UDOT shall re-evaluate its current wet weather monitoring programs and develop and implement a sampling plan to identify pollutants and their loading from selected maintenance facilities and selected roadway drainage locations and assess the performance of control measures used to minimize the discharge of pollutants."

This monitoring plan details the Representative Storm Monitoring Plan that will be implemented by UDOT to fulfill the UPDES permit requirements and 40 CFR 122.26 requirements for wet weather monitoring.

#### 1.1.2 Decisions and Outcomes

The monitoring plan identifies the four monitoring sites and a description of the drainage area, a summary of the process and procedures used to conduct monitoring, the parameters analyzed, and the duration, frequency, and timing of sampling. Data from these monitoring efforts will be used to:

- Provide an estimate of annual cumulative pollutant loadings from the MS4,
- Estimate event mean concentrations and pollutants in discharges from outfalls,
- Identify and prioritize portions of the MS4 requiring additional controls,
- Assess the performance of control measures to minimize the discharge of pollutants, and:
- Provide a 5 yr summary of parameters analyzed for each site, assessing trends and making conclusions.



## 1.2 Project Schedule

Table 1 outlines the major wet weather monitoring tasks and associated deadlines.

**Table 1: Key Project Milestones** 

Tasks	DESCRIPTION	Critical Due Date
1.	Submit Wet Weather Monitoring Plan	June 30, 2016
2.	Initiate Wet Weather Monitoring Program (Year 1)	January 1, 2017
3.	Spring Wet Weather Monitoring (Year 1)	Spring 2017
4.	Yearly reporting (Year 1)	October 1, 2017
5.	Fall Wet Weather Monitoring Activities (Year 1)	Fall 2017
6.	Spring Wet Weather Monitoring Activities (Year 2)	Spring 2018
7.	Yearly reporting (Year 2)	October 1, 2018
8.	Fall Wet Weather Monitoring Activities (Year 2)	Fall 2018
9.	Spring Wet Weather Monitoring Activities (Year 3)	Spring 2019
10.	Yearly reporting (Year 3)	October 1, 2019
11.	Fall Wet Weather Monitoring Activities (Year 3)	Fall 2019
12.	Spring Wet Weather Monitoring Activities (Year 4)	Spring 2020
13.	Yearly Reporting (Year 4)	October 1, 2020
14.	Fall Wet Weather Monitoring Activities (Year 4)	Fall 2020
15.	Spring Wet Weather Monitoring Activities (Year 5)	Spring 2021
16.	Yearly reporting (Year 5)	October 1, 2021
17.	Fall Wet Weather Monitoring Activities (Year 5)	Fall 2021



## 2 Sampling Approach

## 2.1 Event Monitoring Requirements

The UPDES Permit requires wet weather monitoring to be conducted twice each year, once each in the spring and fall (subject to the occurrence of appropriate storm events), and to be separated by at least 45 days. The identification of the spring and fall seasons for sampling is a result of the formation of predictable frontal-type storms during these times of year. This avoids complication in summer months, when storms tend to be cloudburst-associated and during the winter when snow, ice and sleet can dominate precipitation.

The minimum allowable rainfall for monitoring a representative storm is determined from average storm data and observed storm patterns. The specific storm guidelines outlined in section 5.2.2.6. of the permit will be used for representative storm monitoring, which includes

- A minimum of 0.20" of precipitation
- Preceded by at least 72 hours from the previously measurable (0.1" of rainfall) storm event.

To fulfill permit requirements for storm event criteria, UDOT monitors National Weather Service broadcasts, radio and television media broadcasts, the internet and other resources that may be available in an effort to determine the likelihood of a representative storm event occurring. To fulfill antecedent rainfall and other volumetric rainfall requirements for monitoring a storm event, UDOT will monitor actual rainfall amount at rain gauges associated either at the site or near the site. When a qualifying storm is forecasted, sampling teams are mobilized.

## 2.2 Monitoring Locations

The permit requires UDOT to "select at least four monitoring locations" (Part 5.2.2). Each monitoring site must include a description of the drainage area, including land uses, control measures, activities and materials that could impact storm water discharges. The outfalls chosen must also at a minimum, 25% of the outfalls sampled shall be from each of the following:

- Roadway maintenance facility location determined by the Permittee to be representative
  of pollutant sources and expected loading from the facility;
- Roadway runoff location to establish baseline storm water runoff and discharge data;
   and
- Roadway runoff location with control measures to evaluate the effectiveness of such measures at treating storm water runoff.

The proposed monitoring sites are identified below in Table 2 and in Figures1-3. Sites maps, source controls, pollution sources, and full land use descriptions of each site can be found in Appendix A.



**Table 2: Monitoring Site Locations** 

Site ID	Name	Location	Description	Associated rain gauge
JOR 3	Jordan River	NE Corner of Murray Pkwy Golf Course, S. side of I-215	Transportation Land Use: I-215 Highway Corridor	Midvale Operations Facility
MVC01	Mt. View Basin Inlet	S. side of UDOT basin N. of Porter Rockwell Blvd and W. of Redwood Rd. in Bluffdale	Transportation Land Use: Mt. View Highway Corridor	Rain gage at the inlet sampling site
MVC02	Mt. View Basin Outlet	N. side of UDOT basin N. of Porter Rockwell Blvd and W. of Redwood Rd. in Bluffdale	Outlet of basin serving Mt. View Highway Corridor	Rain gage at the nearby inlet sampling site
Maint01	UDOT Maint. Station 3427	N. Corner of UDOT Maint. Station - 1839 W. 1250 S. Orem, Utah	UDOT Maintenance Station	Rain gage at sampling site

**Figure 1: UDOT Wet Weather Monitoring Locations** 

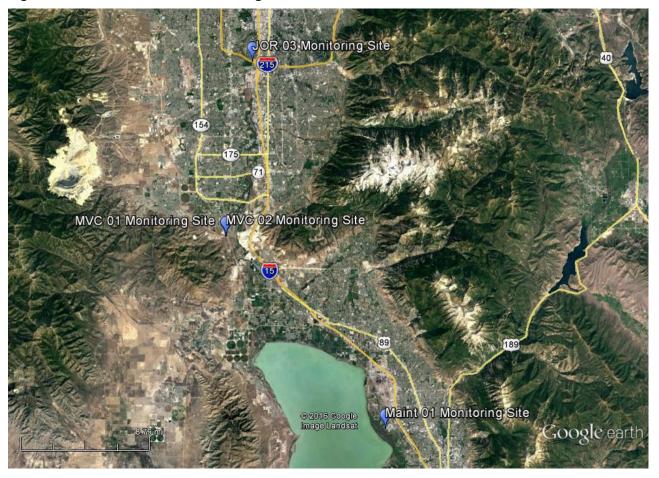




Figure 2: JOR 03 Monitoring Site Location



## <u>Legend</u>



**Tributary Drainage Area to JOR 03 Monitoring Site** 



Figure 3: MVC 01 and MVC 02 Sampling Location



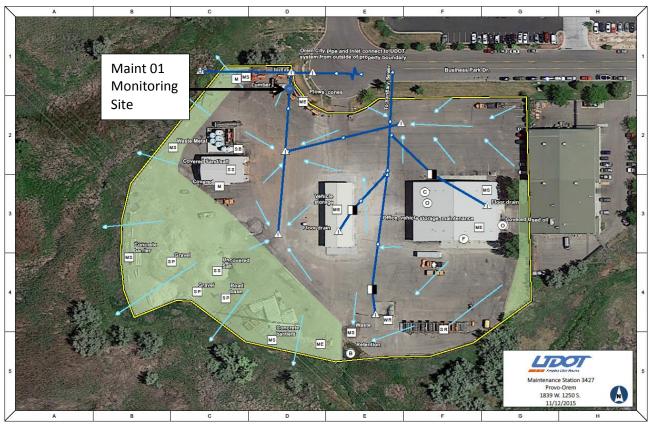
#### **Legend**

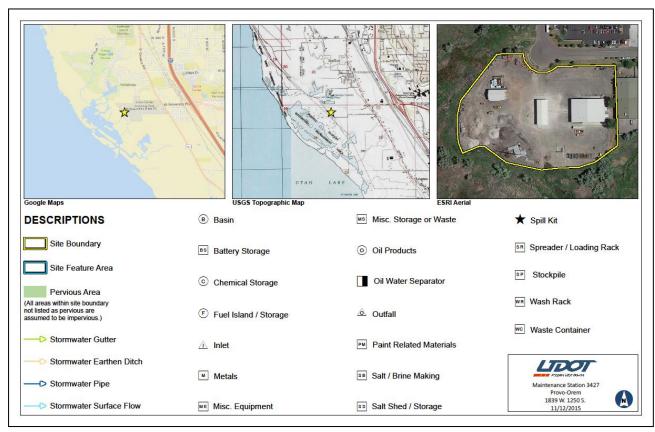


**Tributary Drainage Area to Monitoring Site** 



Figure 4: UDOT Maintenance Station 3427 - Monitoring Location







## 2.3 Sampling Event Coordination and Management

Preparation for stormwater sampling is imperative for a successful sample event. One person is designated as the storm coordinator in order to ensure sampling success and proper sampling techniques. The storm coordinator is responsible for watching potential storms that meet the criteria identified herein, assembling the sample team, ensuring the samples are delivered to the laboratory with proper documentation and providing necessary training.

## 2.4 Pre-storm Preparation Strategy

Weather forecasting, storm selection for monitoring, mobilization strategies, and selecting appropriate automatic water sampler settings are all to be included in pre-storm preparation. Weather forecasting is necessary to obtain the most reliable and up-to-date information on the storm's physical characteristics. Based on the probabilities of the rainfall amounts, coverage, intensities, and duration, the storm event coordinator will determine when to mobilize and prepare for a sampling event.

Storms will be classified as either:

- 1. Poor or Inadequate (less than 50% probability)
- 2. Marginal (50-75% probability) or
- 3. Good (greater than 75% probability)

Storm sampling preparations will be made in a series of steps. If the forecast is "good" or "marginal", the sampling stations will be set up for sampling before the storm. This includes setting automatic water samplers to obtain the correct volumes from predicted rainfall amounts.

Forecasts will be updated 18-24 hours before the predicted storm event. At this time, the storm coordinator will decide whether to prepare for mobilization of crews, if the storm is still a "GO". If the storm downgrades to less than 50% probability of rain, samplers will be turned off and the sampling will be considered a "NO-GO". If the storm is "marginal" 18-24 hours before the predicted storm event, then a 4 to 8 hour forecast will be important: sampling may still be called off if it downgrades to less than 50% probability of rainfall. This will be a judgment call on the storm coordinator's part.

If the decision is made to sample a storm event, the mobilization will take place shortly thereafter. Team members will need to be on "stand-by" until final details or where and when to meet is determined. Team members must be familiar with the Health and Safety Guideline, the Mobilization Checklist, the Sampling Packet and the Chain-of-Custody forms (Appendices C). The storm coordinator is responsible for ensuring the samplers are set for the appropriate volume, ice is available, and that each station is operational and ready for the storm. Each mobilized crew must be in contact with the storm coordinator.

## 2.5 Storm Sampling Management

In-field stormwater sampling events will be coordinated from a centralized location via cell phone. The center will be in constant contact with each crew in the field and will notify crews on when to standby and when to proceed in the field. The storm event coordinator will be updated with appropriate information from each station on a regular basis. If problems with the sampling equipment arise, the storm coordinator will decide the next course of action. The coordinator will also determine when the storm is "over": this may not be when the rain stops, but when the flow at the station drops to a pre-determined level (approximately 1.2 times the normal flow) and may not occur until long after the rain stops.



## 2.6 Chain-of-Custody and Sample Transfer Procedure

Once samplers are collected in the field, they will be taken to a centralized location to await transfer to the laboratory, or be taken directly to the laboratory as necessary to meet lab holding times. Samples will be held in an ice chest or refrigerator at around 4°C. Samples transferred from one agency to another for analysis require the use of Chain-of-Custody Form (CoC) procedures that include the following requirements for the laboratory to accept custody of samples.

#### 2.6.1 Sample Label

Samples must be properly labeled using waterproof ink to record the station number, date, time (military), sample type, and sampler name before collection. The labels are generated automatically by per contract lab instructions. For QA/QC samples (duplicates, spikes, blanks, etc.), they will be generated in a similar manner with pseudonyms for site identification numbers.

#### 2.6.2 Chain-of-Custody Forms

CoC forms are provided for each sampling event to field sampling personnel for detailed record keeping. The CoC form consists of three documents: the sample logsheet, field data sheet, and transferal CoC. The sample logsheet contains the project name, sample number (work request number), sample location, test required, and number of bottles per location. The field sheet contains the field sampler initials, sample location, date and time of collection, weather, sample log number, collection type (grab or composite), missed samples due to unexpected problems, and field observations relevant to sample integrity. The transferal chain of custody contains the project name, sample number, date and time of collection, number of samples, matrix type (marine, freshwater or other), field sampler name, and tests requested. A duplicate copy system, both copies having original signatures, is maintained in the data management files.

#### 2.6.3 Transfer of Custody

Immediately following receipt of water samples to the laboratory, a staff member will conduct inventory and document information regarding sample transport and laboratory processing according to the specified laboratory Standard Operating Procedures (SOP). Samples destined for analysis by one of the contract laboratories are placed in a 4°C isothermal refrigerator and logged into the electronic database records. Both copies of transferal chain of custody are kept with the samples until transferal of the samples to the contract laboratory courier service.

## 2.7 Sampling Team

UDOT uses experienced personnel to help ensure proper techniques are used. The number of team members varies with each sample event and is dependent on availability and the number of stations to be monitored.

#### 2.7.1 Training

Sampling team members will be properly trained in the use of automated monitoring equipment and proper clean sampling techniques. Team members will receive training from the supervisors, internal experts, and equipment suppliers. Sampling teams will also receive a briefing before a sampling event. This includes assigning stations, reviewing sampling instructions, and proper documentation and health and safety requirements. A post-event follow-up is also conducted to identify equipment problems and note any issues with sampling. Training may be conducted in the office or at sample stations, and will be documented.



#### 2.7.2 Health and Safety

Team members are required to understand and implement the Health and Safety Plan (Appendix C)

#### 2.8 Sampling Techniques

The sampling for water quality will be conducted two ways: grab sampling and flow weighted composite sampling. Grab samples are collected at stations with base flows, before the beginning of each storm event (Base) and within approximately the first 30 minutes of runoff (Rise). Flow weighted composite samples are collected for the entire event, or at a minimum the first three hours of the event, using automatic samplers. These samplers can be configured for sample volume and frequency of collection according to the needs of the sample event. For insitu parameters and for sampling using automatic water samplers, manufacturer-recommended procedures, cleaned and certified sampling apparatuses, and sampling tubing will be used to avoid sample contamination.

#### 2.8.1 Grab Samples

Grab samples are collected for both Base and Rise samples. The guidelines listed below and in Appendix B will be employed when collecting grab samples.

- 1. Disposable powder-free vinyl gloves are worn for personal protection and to prevent sample contamination.
- 2. Grab samples will be collected directly into laboratory supplied containers whenever possible. If this is not possible, samples shall be collected in a decontaminated glass container before decanting to the laboratory containers.
- 3. Where feasible, samples are collected from the horizontal and vertical center of the outfall channel as much as possible.
- 4. Stagnant areas near the edge of stormwater runoff are avoided as collection sites. Samplers will avoid stirring the bottom sediment during sample collection as much as possible.
- 5. Sample containers will be held so the container opening faces upstream.
- 6. Samplers will avoid the touching of the inside of sample containers to avoid contamination.
- 7. Upon collection, sample containers will be placed in coolers on ice. Sample collection times will be recorded on the CoC and Station Data Sheets.
- 8. Provide an explanation if unable to collect a grab sample.
- 9. Samplers will take extreme care when filling sample containers to avoid spills, splatter or washout of container preservatives.

#### 2.8.2 Flow Weighted Composite Samples

All flow measurement will be conducted at automatic water samplers located at each site, and will be programmed to collect a sample at predetermined intervals when channel flow is above base flow. Each station may have different instructions depending on the site and drainage basin. Each sample collection tray within the sampler will be iced before sample initiation to preserve sample integrity.

Flow monitors will be located at each site to record flow rate. The flow monitors may be standalone, or they may be integral to the automatic water samplers. Flow rates will be monitored continuously throughout each storm event. If continuous monitoring is not possible, flow rates will be recorded at the same time each sample aliquot is collected.



## 2.9 Analytical Requirements

Table 3 lists each parameter to be monitored and analyzed for runoff.

**Table 3: Parameters for Flow Weighted Composite Analyses** 

Pollutant	Reporting Units <sup>1</sup>	Analytical Method <sup>2</sup>
Biochemical Oxygen Demand	mg/L	SM10200 J
Total Suspended Solids	mg/L	SM2540B
Total Dissolved Solids	ml/L	SM2540F
Total Nitrogen	mg/L	EPA 350.1,EPA 351.2, EPA 353.2
Dissolved Nitrogen	mg/L	EPA 350.1,EPA 351.2, EPA 353.2
Total Kjeldahl Nitrogen	mg/L	EPA 350.1,EPA 351.2, EPA 353.2
Total Phosphorus	mg/L	SM4500P
Dissolved Phosphorus	mg/L	SM4500P
Cadmium	μg/L	EPA 200.8
Copper	μg/L	EPA 200.8
Lead	μg/L	EPA 200.8
Zinc	μg/L	EPA 200.8
Selenium	μg/L	EPA 200.8
Mercury	μg/L	EPA 245.1
рН	S.U.	SM4500H
Hardness	Calc.	EPA 200.8
Oil and Grease	Yes / No	Report Visual

 $<sup>^{1}</sup>$ Mg/L = milligrams per liter,  $\mu$ g/L = micrograms per liter, S.U. = standard units.

**Table 4: Parameters for Grab Sample Analyses** 

Pollutant	Reporting Units <sup>1</sup>	Analytical Method
pН	S.U.	SM4500H
Oil and Grease	Yes / No	Report Visual

<sup>&</sup>lt;sup>1</sup>μg/L = micrograms per liter, S.U. = standard units.

## 2.10 Sampling Plan Review and Modification

This Plan will be reviewed on an annual basis, and may be modified as necessary. An annual review of the representative sampling will be conducted to review the data, identify problems and assess the effectiveness of the monitoring plan. Any modifications to this plan will be submitted to the Utah Division of Water Quality for review and approval.

<sup>&</sup>lt;sup>2</sup>Analytical method equivalents may be used.



## 3 Quality Assurance / Quality Control Plan

In order to assess and maximize the quality of data, a strict Quality Assurance and Quality Control (QA/QC) plan must be followed in all phases of the sampling program. This includes sampling, analysis, data reporting, and data validation.

## 3.1 Sampling Equipment Decontamination

Sample collection containers for grab and composite samples are decontaminated using phosphorus-free detergents and deionized water, and they are air-dried before use.

Each station and sample type has dedicated sample collection containers to avoid cross-contamination in the field. All equipment, including but not limited to strainers, pumps, and tubing, are decontaminated with thorough cleaning between monitoring periods. All strainers and pump tubing are thoroughly cleaned between monitoring periods and stored in clean HDPE bags. Automatic sampling field equipment and portable peristaltic pumps are decontaminated by flushing the intake line two times with Type 1 water before and immediately after sample collection periods. Automated samplers, in addition, are required to perform a rinse cycle at the sampling location to remove the Type 1 water before sample collection and to avoid unwarranted dilution of the stormwater. Automated samplers that are expected to remain inactive but that are required to remain at the sampling station are rinsed and sealed within a clean HDPE bag.

## 3.2 Chain-of-Custody Requirements

Chain-of-custody documentation is used to reduce the likelihood of sample contamination or mishandling. The CoC record is employed as physical evidence of sample custody and control. The system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. The custody form is provided in Appendix C.

## 3.3 QA/QC Samples

Potential laboratory and/or field contamination should be accessed through analysis of field blanks, sample duplicates and splits at a frequency of one QA/QC sample per storm event. QA/QC samples will be collected for one set of parameters (prepared laboratory bottles for groups of parameters). Each QA/QC sample type, each location and parameter group will be selected on a random basis using a random selection Excel spreadsheet.

#### 3.3.1 Field Blank

Field blanks are collected to check for cross-contamination that may occur during sample collection, processing, and transport. Field blanks consist of filling a laboratory bottle with deionized water in the field. The blank is treated as a sample, and is processed and analyzed for the same parameters as field samples. Field blanks are not collected for composite samples.

#### 3.3.2 Sample Duplicate

Sample representativeness (the degree which collected samples reflect actual field samples) will be assessed through the analysis of duplicate field samples. The results of the field duplicate will be compared to the original sample to get a relative percent difference between the two samples. Duplicate samples cannot be collected for composite samples due to the methodology.



#### 3.3.3 Sample Split

Split samples will be collected for QC purposes, and taken to the laboratory for analysis. Split samples measure the variability resulting from the inherent heterogeneity of the water, rather than laboratory variance. Split samples will be collected at random sampling locations, collected in the same manner as the routine samples.

Depending on the volume of sample collected for the grab samples, split samples may not be an option. This will be determined on-site.

## 3.4 Laboratory Requirements

Samples collected during this project will be analyzed in accordance with standard EPA and/or nationally accepted analytical procedures. The laboratory will adhere to all applicable QA/QC requirements established in their QA/QC plan.

The laboratory contracted to perform the chemical analyses must be an accredited facility. The laboratory must also meet QA/QC objectives, including holding times, sample preservation techniques and target detection limits for each analytical method. Maximum holding times, sample preservatives and volume requirements for sample parameters are identified in Tables 5 and 6.

**Table 5: Laboratory Holding Times and Preservatives** 

P	arameter	Preservative	Holding time
Susp	ended Solids	None	7 Days
Diss	olved Solids	None	7 Days
	pH*	N/A	In-situ
Oil a	and Grease*	N/A	In-situ
F	Hardness	HNO <sub>3</sub>	6 months
Phosphorus	Total	H <sub>2</sub> SO <sub>4</sub>	28 days
	Ortho	None	48 hours
	Nitrite+ Nitrate as N	N/A	48 hours
Nitrogen	Total Kjeldahl	H <sub>2</sub> SO <sub>4</sub>	28 days
	Ammonia	H <sub>2</sub> SO <sub>4</sub>	28 days
To	otal Metals	HNO <sub>3</sub>	6 months
Diss	olved Metals	N/A	6 months
Biochemica	al Oxygen Demand	N/A	48 hours

<sup>\*</sup>pH is a field test; if requested to be performed at the lab, it will be tested ASAP. Oil and Grease will be a visual documentation of present/non-present.



**Table 6: Laboratory Required Volumes** 

Parameter	Required Sample Volume
Total Suspended Solids Total Dissolved Solids pH Nitrate /Nitrite Orthophosphate Biochemical Oxygen Demand pH	0.5 gallons (~2L)
Total Kjeldahl Ammonia Total Phosphorus Total Metals Dissolved Metals Hardness	1 pt. (~0.5L)
Oil and Grease	1 qt. (~1L)

On occasion, the required sample volume is not obtained. In this circumstance, the following is a list of priority parameters in order of importance:

- Solids (total suspended solids [TSS] and total dissolved solids [TDS])
- Nutrients (total phosphorus, orthophosphate, nitrate, nitrite, TKN, and ammonia)
- Oxygen (biochemical oxygen demand [BOD])
- Total Metals (cadmium, copper, lead, zinc, selenium, mercury) and hardness



## 4 Sampling Waiver

## 4.1 Sampling Waiver

When a discharger is unable to collect samples due to adverse climatic conditions, the discharger must submit in lieu of sampling data a description of why samples could not be collected, including available documentation of climatic conditions causing the missed sampling. Adverse climatic conditions which may prohibit the collection of samples includes weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).



## **Appendix A: Wet Weather Monitoring Locations**

Described below are the four proposed monitoring locations intended to identify pollutant loadings from maintenance activities, roadway surface drainage and water quality control measures:

#### Site 1 - JOR 03

**Site Description** –This existing monitoring site is located at the northeast corner of Murray Golf Course at the outlet of the drainage system that serves a portion of I-215.

**Tributary Area** - The tributary drainage area to this site is approximately 355 acres and consists of paved surfaces and landscaped areas within UDOT's right of way, from approximately 600 East to the outlet location.

**Monitoring Purpose** - To characterize base flows and storm water runoff from the I-215 corridor.

#### Site 2 - MVC 01

**Site Description** – This proposed monitoring site is located at the southwest side of the UDOT detention basin north of Porter Rockwell Blvd and west of Redwood Rd. in Bluffdale.

**Tributary Area** - The tributary drainage area to this basin is approximately 31 acres and consists of paved surfaces and landscaped areas within UDOT's right of way, from approximately milepost 3.8 of Mt. View Corridor, southeasterly to the detention basin.

**Monitoring Purpose** - To characterize base flows and stormwater runoff from Mt. View Corridor and Porter Rockwell Blvd.

#### Site 3 – MVC 02

**Site Description** – This proposed monitoring site is located across from Monitoring Site 2, at the outlet of the basin.

**Monitoring Purpose** - To assess the performance of the detention basins a water quality feature for treating roadway runoff.

#### Site 4 - Maint 01

**Site Description** – This proposed monitoring site is located at the north corner of UDOT Maintenance Station 3427 located at 1839 W. 1250 S., Orem Utah.

**Tributary Area** - The tributary drainage area to this site is approximately 3.3 acres and consists of impervious surfaces, buildings, vehicle and equipment maintenance areas, brine making areas, loading/unloading areas, waste storage/disposal areas and equipment operating areas.

To minimize pollutant discharges, this maintenance station has covered storage areas for chemicals, a salt storage shed, a retention basin, oil/water separators and a storage container for collecting used oil.

**Monitoring Purpose** - To characterize storm water runoff from a UDOT maintenance station and determine pollutant loadings that discharge to off-site areas.



## **Appendix B: Wet Weather Monitoring Field Procedures**

B.1	Mobilization Checklist
	Keys to sample stations and gates
	Grab sample coolers and ice
	Grab sample bottles and equipment
	Latex sampling gloves
	Marking pens
	Extra tubing/spare parts for sampler/tools (screwdriver)
	Data Transfer Unit (DTU) and/or laptop computer
	Manhole access tools if necessary (pick, etc.)
	Flashlights
	Reflective safety vests
	Rain gear
	Boots
	Mobile phone
	Contact list
	First aid kit

#### **B.2** Contact List

Name	Affiliation	Role	Home / Cell	email

## **B.3** Health & Safety Guidelines

The following guidelines briefly outline important health and safety precautions for all field personnel. In order to minimize potential safety hazards, personnel are to exercise extra precautions when working around outfalls and avoid proceeding into areas that will compromise safety.



#### **B.3.1 General Safety Precautions**

- Emergency Personnel Injury If affected personnel can be moved safely, then take him/her to nearest health care facility. If there is a possibility of a head, neck or back injury, do not move the injured party; contact paramedics (911). Notify UDOT Dispatch as soon as possible.
- Vehicle Safety Use caution at all times when driving. Park vehicles off the traveled way
  when possible. Always use safety cones and vehicle safety flashers to alert oncoming
  traffic of the parked vehicle.
- Confined Spaces Under no circumstances are field personnel authorized to enter manholes, storm drains, culverts, or any other confined spaces.
- Steep Embankments A tie-off rope shall be used by all personnel required to descend embankments, and the rope shall be manned at the top of the embankment.
- Water safety Use basic water safety precautions around flowing streams and channels
- Proper Lifting To avoid back strain or injury, use team-lifting techniques when possible.
   Lift with leg muscles, not with the back muscles, by bending at the knees, not at the waist.
- Cold Exposure Because sampling will occur in March and October, exposure to cold may be a potential hazard. To guard against cold injury, wear protective clothing; have warm shelter available, and carefully monitor field personnel and weather conditions. Some of the symptoms of cold stress include pain in an exposed extremity and/or shivering.
- If any symptoms of cold stress occur, the affected personnel should be removed from the cold environment. If the symptoms are not relieved, professional medical attention should be sought.
- Heat Stress Heat stress is one of the most common (and potentially serious) illnesses
  that affect field personnel. The potential for heat stress is dependent on a number of
  factors, including environmental conditions, clothing, workload, physical conditioning,
  and age. The effects of heat stress can range from mild symptoms, such as fatigue,
  irritability, and decreased mobility to death. Some symptoms of heat stress include the
  following:
  - Heat rash: A result of continuous exposure to heat and humidity, heat rash decreases the body's ability to tolerate heat.
  - Heat cramps: A result of profuse perspiration with inadequate fluid intake and chemical replacement, heat cramps are signaled by muscle spasms and pain in the abdomen and the extremities.
  - Heat exhaustion: A result of increased stress on various organs. The signs of heat exhaustion include elevated body temperature; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and weakness.
  - Heat stroke: The most severe form of heat stress, heat stroke must be relieved immediately to prevent severe injury or death. The signs of heat stroke are red, hot, dry skin; elevated body temperature; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma. The body must be cooled and professional medical attention sought immediately.
  - Preventive measures to preclude heat stress include regular work breaks during field activity, and regular water and food replenishment. Should one or more symptoms be detected, the affected worker should drink plenty of fluids, and seek professional medical attention, it required.



#### **B.3.2 Personal Protective Equipment**

General work clothes will be sufficient for field personnel conducting the wet weather monitoring, with limited additional personal protective equipment. All field personnel should have an extra set of dry work clothes available. The following work clothes are recommended:

- Long pants;
- Waterproof work boots, steel toe and shank preferred;
  - Rubber outer boots should be worn when boots may come in contact with stormwater discharges or other surface waters;
- Latex gloves must be worn at all times while collecting water samples;
- Protective goggles or glasses are required when collecting samples and when working in the laboratory:
- Reflective Vest

## **B.4 Water Quality Sampling Procedures**

Sample bottles will be obtained from the laboratory; these bottles are prepared for specific analysis at the laboratory. Sample bottles will be labeled appropriately before sample collection, preferably before mobilizing. Sample sites will be located by GPS.

The following guidelines will be employed when collecting grab samples:

- Grab samples will be collected directly into laboratory supplied containers for the specific analyte whenever possible.
- Sample containers will be properly labeled.
- Grab samples will be collected from the horizontal center channel, as much as possible.
- Samplers will avoid stirring the bottom sediment during sample collection, as much as possible.
- Sample containers will be held so the container opening faces upstream as applicable.
- Samplers will avoid the touching of the inside of sample containers to avoid contamination.
- Upon collection, sample containers will be placed into designated coolers and cooled with ice. Sample collection times will be recorded on the chain-of-custody forms and field data sheets.
- Samplers will take extreme care when filling sample containers to avoid spills, splatter or washout of container preservatives.
- If collection of samples directly into sample containers is not feasible, using supplied Teflon Bailers is permissible.

## **B.5** Chain of Custody

When samples collected for laboratory analysis in addition to Field Data sheets Chain of Custody (COC) forms supplied by the contract lab must be filled out per lab instructions. COC provides for seamless tracking of the sample throughout the entire process and offers documentation that proper protocol and protections of the sample were followed and thus results are valid and defendable. See Appendix C for sample form.

## **B.6 Equipment Decontamination**

Sample collection containers will be decontaminated using phosphorus-free detergent and deionized water. Sample collection containers will also be decontaminated with deionized water between sample collections at each site. Bottles obtained from the analytical laboratory do not require decontamination. Field test kits will be cleaned in accordance with manufactures' instructions.



# **Appendix C: Sample Chain of Custody Form**

CHEMTE	CH - FORD ANALYTICAL	LABORAT	ORY																С	HAII	N OF	CU	STO	DY			
COMPANY:					BILLIN	IG AD	DRE	88:		_											_						
ADDRE88:			BILLIN	ig ci	TY/81	TATE	ZIP:																				
CITY/8TATE/ZIF	·				PURCH	PURCHASE ORDER #:																					
PHONE #:		FAX:			_															CHEMTECH-FORD							
CONTACT:		PROJECT:			_														LABORATORIES								
EMAIL:					_			OUND													_						
						-Em	nediled)	Turrence	and sub	actito a	didikione	_	E8T8	DE	MICO	TER	_						Т	Baot	insta		
						Н	_	Т					E016	POER	UE	HEL	_	_	_	_	$\top$	$\overline{}$	┢	Бач	опа		
																							n+E. odi (Present/Absent)	n+E. coli (Enumerated)	Osumi		
Lab Use Only	CLIE	NT SAMPLE INF	ORMATION			1	l				l				- 1	١	- 1				1	1	TO MIGHT	E G		ě	
	LOCATION / IDENTIFICATION	DATE	TIME	MATRIX	Field: Residual Chlorina	1									- 1	١					1	1	Total Cofform +	Total Colfform + E.	HPC (Rate	E. CallOnly	
	1.					Т	Г	Т	Г	Г	Г	П		$\neg$	ℸ	┪	╗	$\neg$	$\neg$	╅	十	$\top$	Ė	$\sqcap$	$\overline{}$		
	2					Г				Г		П		一	寸	┪	┪	$\neg$	┪	一	十	$\top$	Г	П	$\Box$		
	3.					Г	Г			Г		П		╛	寸	╗	┪	$\neg$	$\neg$	寸	十	T	Г	П	$\Box$		
	4					Г				Г	Г	П		┪	┪	╗	╗	$\neg$	$\neg$	$\neg$	十	╈	Г	П	$\Box$		
						Г				Г	Г	П		$\neg$	┪	╗	╗	$\neg$	$\neg$	$\neg$	丅	┰	Г	П	$\Box$		
						Г				Г	Г	П		$\neg$	┪	┪	╗	$\neg$	$\neg$	$\neg$	十	Τ	Г	П	$\Box$		
	7.					Г				Г	Г	П		$\neg$	┪	╗	╗	$\neg$	$\neg$	$\neg$	$\top$	Т	Г	П	$\Box$		
						Г	Т	Т	Г	Г	Г	П		$\neg$	ℸ	╗	╗	$\neg$	$\neg$		十	$\top$	✝	П	$\Box$		
						Г	Т	Т	Г	Г	Г	П		$\neg$	ℸ	┪	╗	$\neg$	$\dashv$		十	十	✝	П	$\Box$		
	10					Г	Т	Т	Г	Г	Г	П	$\neg$	$\dashv$	ℸ	ℸ	╗	$\dashv$	$\dashv$		十	十	✝	П	$\Box$		
	Sampled by: [print]		Sampled by: (signal	ure]		_	_	_				_	ON	ICE		NC	ото	N ICE	E .	т	emp (	C°):	_		_		
	Special instructions:		•																		ommer rejecte						
	Relinquished by: [signature]			Date/Time		Rece	ived by	y: (sign	afure]										1	Oute/Tin	10						
	Relinguished by Introduce					Received by Interestrant Date/Time										less.											

Received by: [signature]

CHEMTECH-FORD 9632 South 500 West Sandy, UT 84070

Relinquished by: [signature]

801.282.7299 PHONE 865.792.0093 FAX www.chemtechford.com Date/Time

Payment Terms are not 30 days CAC. 1.5% interest charge per month (18% per annum). Câent agrees to pay collection costs and attorney's feee.